



Advanced Measurement Systems Available to PIWG Members

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Introduction

- We're developing advanced measurement technologies to meet NASA goals:
 - reduce design cycle time, reduce emissions, reduce testing time, increase safety.
- These technologies are saving us money. They may be able to save you money too.
- As PIWG members, you have a built-in infrastructure for receiving this information.

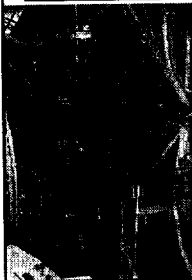
These technologies are available now for technology transfer:

- Optical Diagnostics
- Thin film technology
- MEMS devices

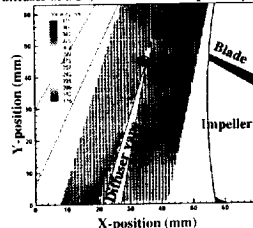


2D/3D Particle Imaging Velocimetry

- Saved \$60K in FY99 for compressor research by reducing test time by 10 – 100X compared to laser Doppler velocimetry
- Previously unavailable data shortens design time



Movie shows sequence of time-averaged flow in the diffuser of a 21,000 RPM centrifugal compressor



Pressure and Temperature Sensitive Paint for Turbomachinery

- Cost of one \$35K PSP/TSP system less than cost of instrumenting two blades.
- Previously unavailable data shortens design time by intuitive data representation and real-time indication of operating conditions.

Normalized Pressure

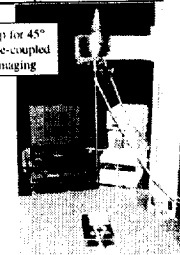


Surface Temperature and Pressure measured on low speed fan



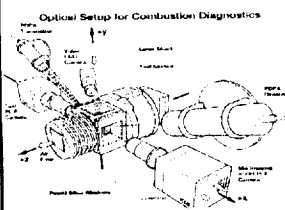
Temperature

Test setup for 45° borescope-coupled camera imaging



Combustion Diagnostics

- Increased knowledge in FY99 for combustion research by showing effect of combustor configuration changes on mixedness and fuel/air ratio distributions.
- Planar data combined with PDPA yields most complete picture of combustion flow currently available.



Sideview Crossflow View



No swirl



With Swirl, & injector rotated 180 degrees



Summary

Advanced Measurement Systems Available to PIWG Members

- New technology makes measurements faster, more reliably, or where never before possible.
- Save money by reducing test times
- Save money by providing intuitive data to designers
- Available now for tech transfer